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### 1. JP63143973A 19880616 FILM FORMING METHOD

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PURPOSE: To enhance the evenness of a coated film, by adjusting the pigment volume concentration of a pigmented coating same as, or very similar to, that of an intercoating with a specific extender pigment and uniforming shrinkage between films in coating a part of a wet film for intercoating with the pigmented coating.

CONSTITUTION: A part of a wet film of intercoating I is coated with a pigmented coating II and after both films are heat cured simultaneously, another pigmented coating III is applied on the uncoated part of the pigmented coating II or the whole of cured film, the coating is finished. The coating I is a solution- type heat curable coating comprising a heat-curable resin composition, a color pigment and/or an extender pigment as main components. The pigment volume concentration of the pigmented coating II is adjusted with an extender pigment selected out of talc, clay and barium sulfate so as to be same as or very similar to that of the coating I. By said process, the shrinkage factor of both films at the time of simultaneous heat curing is almost equal, and the generation of unevenness is controlled.

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Title of the Invention  
**FILM FORMING METHOD**

Specification

1. Title of the Invention

**FILM FORMING METHOD**

2. Claim

Film forming method characterized by painting the solution type thermosetting paint (I) which has thermosetting resin, coloring pigment, and (or) extender pigment as the main ingredients, then by painting the coloring paint (II) which is prepared with one or more sorts of extender pigments selected from talc, clay, and barium sulfate so that the pigment volume concentration is same as, or similar to, this paint (I) on a part of this coated surface, and after hardening both films simultaneously by heating, by painting the coloring paint (III) on the coated surface of the above-mentioned paint (I) on which the paint (II) is not painted, or on both the coated surfaces of the paint (I) and the paint (II).

3. Detailed Explanation of the Invention

This invention is related to the improvement of the finish appearance of a film which is prepared by painting a coloring paint to a part of the wet film surface, and after heat-hardening of both these films simultaneously, by painting other coloring paints on the non-painted portion of this coloring paint, or further on this colored film surface.

As a specific example of the above-mentioned painting system, for example, there is a so-called 2 tone finish by which a coloring paint is applied to the target portion of the intercoating wet film surface that is not yet hardened, and after both these films are heat-hardened simultaneously, other coloring paints are applied to the non-painted portion of the above-mentioned coloring paint of the intercoating coated surface.

In the painting process of automobile inner shell to which a primer such as electrodeposition paint is applied, there are cases where the top coating paint is applied to the inner board when the intercoating film of the outer board is in the wet (un-hardened) state. Since splashes (mists) of the top coating paint for the inner board are easy to stick on the intercoating wet coated surface of this outer board at this time, the process by which top coating is carried out to the whole area of the intercoating surface of the outer board after heat-hardening the film in that state can also be mentioned.

The reason for painting a coloring paint over the un-hardened wet intercoating film by these

methods is to skip the printing process in order to reduce the cost and improve the productivity.

However, for the above-mentioned 2 tone color finish or the painting process for the automobile inner shell, to the film formed by applying the coloring paint (for example, the first coloring paint for the 2 tone color or its mist, or the mist of the top coating paint applied to the inner board) to the un-hardened wet intercoating film surface and by further applying other coloring paint (for example, the second coloring paint for the 2 tone color or its mist, or the top coating paint for the outer board) after heat-hardening these, unevenness occurs to the misted portion or the color boundary portion of the 2 tone finish, and it has been the cause to reduce the smoothness.

Although grinding the uneven parts has been performed in advance to painting the above-mentioned other coloring paint in order to improve smoothness, it is inadequate in practice, and unevenness cannot be improved, and the improvement is desired strongly.

Thus, as a result of wholehearted inquiry aiming at the improvement of the smoothness in the above-mentioned painting system, the inventors judged that a part of the coloring paint mists, etc remained on the surface layer of the intercoating film that was grinded smoothly, that, when other coloring paint is applied to these coated surfaces, the solvent in the coloring paint swelled the intercoating film and the coloring film (mist), and that, when printing is performed afterwards, unevenness occurs to the other paint applied over due to the different rate of contraction between the intercoating film and the coloring film (mist).

That is, at the time when the other coloring paint is applied and printed, if the rate of contraction of the coloring film (mist) was small and that portion will dent, and if the rate of contraction was large, it will project, and it was imagined that this appears on the film surface through the other coloring film.

As a result of further study based on such knowledge, the inventors discovered that the smoothness can be improved, for example, in the above-mentioned painting system, by making the pigment volume concentration of the coloring paint applied to the wet intercoating film same as, or similar to, that of this intercoating film using a specific extender pigment.

Namely, this invention relates to film forming method characterized by painting the solution type thermosetting paint (I) which has thermosetting resin, coloring pigment, and (or) extender pigment as the main ingredients, then by painting the coloring paint (II) which is prepared with one or more sorts of extender pigments selected from talc, clay, and barium sulfate so that the pigment volume concentration is same as, or similar to, this paint (I) on a part of this coated surface, and after hardening both films simultaneously by heating, by painting the coloring paint (III) on the coated surface of the above-mentioned paint (I) on which the paint (II) is not painted, or on both the coated surfaces of the paint (I) and the paint (II).

The feature of this invention is that, when applying the paint (II) to a part of the wet film of the paint (I), the pigment volume concentration (henceforth "PVC") of this paint (II) is adjusted with a specific extender pigment so that it is the same as, or similar to, that of the paint (I).

That is, if PVC of both paints was adjusted beforehand in this way, even if the paint (II) sticks to a

part of the wet film surface of the paint (I), for the rate of contraction of both these films being the same or similar, the generation of the unevenness phenomenon described above would be almost none, and smoothness will be improved remarkably.

In addition, although this PVC is desirable to match that of the paint (II) to that of the paint (I), by this invention, it is not limited to this, and even if it is matched to that of the paint (II) or both paints are adjusted, it does not interfere.

Next, the film formation method of this invention is explained further in detail.

(Paint I): It is the solution type thermosetting paint which has a thermosetting resin composite, coloring pigment, and (or) extender pigment, as the main ingredients, and is the paint which forms coated surface of the below-mentioned paint (II) and the paint (III)

Specifically, the intercoating paint for the above-mentioned 2 tone color finish or for the automobile shells, etc. is mentioned, and besides these, other sorts of paint in which special functions are given to a part of the intercoating film.

The thermosetting resin includes a resin composite that has as the main ingredients a base resin selected from, for example, alkyd resin, polyester resin, acrylic resin, etc., and a hardening agent selected from amino resin, polyisocyanate compound (including block compound), etc., and that carries out cross-linking hardening by normal temperature or by heating, and furthermore, resin for paints, such as epoxy resin, polycaprolactone, and cyclohexane dimethanol compound, etc., can be used together, if needed.

Coloring pigments are not specified and titanium oxide, carbon, red ocher, phthalocyanine, etc. are mentioned, for example. It is especially desirable to use titanium oxide and a small amount of carbon for the above-mentioned intercoating paint.

Moreover, extender pigment is not especially limited, and ones selected from talc, clay, and barium sulfate can be used.

Furthermore, corrosive protection pigments, such as zinc CLOMATE, zinc oxide, and strontium CLOMATE, are also employable.

As the pigments for the paint (I), one sort or two or more sorts selected from the above-mentioned coloring pigments, extender pigments, and corrosive protection pigments can be used, and although the combination amount of these pigments are arbitrarily selected according to the purpose, it is desirable to be 10-30%, especially 15-20%, based on PVC as far as the above-mentioned intercoating paint is concerned.

PVC of this invention is the extender concentration of the pigments in the hardened film of each paints.

The paint (I) is the thing that the above-mentioned ingredients are dissolved or dispersed in an organic solvent, and it can be used in the forms of solution type, non-water dispersion liquid type,

highly solid type, etc.

This paint (I) can be applied to target objects, such as cars, electric appliances, machine equipments, and office apparatuses, either directly or after a surface treatment or applying primer, such as electrodeposition paint (cation type, anion type), etc., it does not interfere.

The paint film thickness of the paint (I) is desirable to be 15-60 $\mu$ , especially 20-40 $\mu$ , based on the hardened film.

The application method is not especially limited, and normal methods, such as an air spray, an airless spray, an electrostatic spray, a mini bell, etc., can be employed.

Paint (II): It is the coloring paint applied to a part of the film surface of the paint (I), and its PVC must be adjusted with the extender pigment selected from talc, clay, and barium sulfate so that it will be the same as, or similar to, that of the paint (I).

Applying the paint (II) to a part of the film surface of the paint (I) means that the paint (II) is applied as the first color to a part of the film surface of the paint (I) for 2 tone color finish (and the below-mentioned paint (III) is applied to the non-painted portion of the paint (II) after that), or the phenomenon in which the top coating paint being applied to the inner board of the automobile shell (this corresponds to the paint (II)) becomes mist or granular and sticks to the wet painted surface of the paint (I) on the outer board (and the below-mentioned paint (III) is applied to the whole surface of the outer board after that), for example.

Paint (II) is a coloring paint containing the coloring pigment for making the target color tone, and moreover, it is characterized by being adjusted by a specific extender pigment so that PVC becomes the same as, or similar to, that of the paint (I).

That is, this paint (II) has as the main ingredients a vehicle ingredient, coloring pigment, and extender pigment. And as the vehicle ingredient, the thermosetting resin of the above-mentioned paint (I) is desirable, the coloring pigment can use an organic or inorganic paints of the target color tone, and the extender pigment used is selected from the abovementioned three sorts.

As for the PVC of this paint (II), although PVC of the paint adjusted to the target color tone is usually 0.5% to less than 10% and the defect described above occurs when this is applied to the coated surface of the paint (I) as it is, in this invention, the PVC of the paint (II) is made the same as, or similar to (within  $\pm 5$  of the PVC of the paint (I)), that of the paint (I) using extender pigment.

If PVC of the paint (II) is smaller than 5 compared to that of the paint (I), dents are likely to generate in the misted portion of the fine paint (II) to which the paint (II) is applied or the color boundary portion of 2 tone finish, and if it is greater than 5, these portions are likely to project. Therefore, it is not desirable.

The paint (II) is obtained by dissolving or dispersing each above-mentioned ingredient to an organic solvent.

This paint (II) is applied to a part of non-hardened coated surface of the paint (I).

Although the paint film thickness is not especially limited, it is especially desirable in 2 tone color finish to be 20-40 $\mu$  based on the hardened film.

After applying the paint (II) to a part of the coated surface of the paint (I), both films are hardened by heating.

Although the heating temperature can be arbitrarily selected according to the composition of the paint, 100-200 DEG C is desirable for 10-40 minutes heating.

Next, it is preferable to polish and smooth out the projecting parts by the paint boundary part of the paint (II) or the mist of the paint (II) stuck on the coated surface of the paint (II) in the non-coated part in 2 tone color finish, and by the mist of the paint (II) being applied to the inner board but stuck on the coated surface of the paint (I) on the outer board of an automobile.

After polishing, even if the paint (I) embedded in the coated surface of the paint (I) remains in the shape of spots, it does not interfere.

In this invention, the paint (III) is mainly applied to the coated surface of the paint (I) where the paint (II) is not applied (including the circumference of the film boundary of the paint (II)), or to the coated surface of the paint (I) containing the polished film of the paint (II).

Among these, the former is equivalent to 2 tone color finish, and the latter is equivalent to automobile inner shell finish.

The paint (III) has as the main ingredient a vehicle ingredient and a coloring pigment, and a thermosetting resin selected from the ones listed for the paint (I) can be used as the vehicle ingredient. It can be used in the forms of a solution type in which these ingredients are dissolved or dispersed in an organic solvent and (or) water, high solid type, or non-water dispersion liquid type.

Paint film thickness of the paint (II) is suitable to be 20-40 $\mu$  based on the hardened film.

The execution examples and the comparison examples concerning this invention are explained.

Note that both "part" and "%" are based on weight.

## I. Preparation of Samples

### (1) Target object

Soft steel board (300x300x0.8mm) to which zinc phosphoric system surface processing (PONDELIGHT #144, made by Japanese Parker Rising Co.) is performed, and which is coated by cation type electrodposition paint (electron #9600 made by Kansai Paint Co.).

### (2) Paint (I)

50% alkyd resin solution (*1)	140 part
Upan 20SE (*2)	50 part
Titanium oxide (*3)	100
Xylol / n- heptanol (1/1)	17

The composition consists of the above ingredients was adjusted to have the viscosity of 25 seconds (FORDCUP #4 / 20 DEGC) by SORUBETSUN #150.

PVC was 19.5.

(\*1) 50% alkyd resin solution, consisting of 1 mol of phthalic anhydride, 1 mol of trimethylol propane and 0.5 mol of coconut oil fatty acid, with the hydroxyl group value of 85, oil length of 31% and acid value of 7.3.

(\*2) Butanol modified melanin resin made by Mitsui Toatsu Chemicals, Inc.

(\*3) TITONE R-650 made by Sakai Chemical Industry Co., Ltd.

### (3) Paint (II)

Table 1

	(II)-①	(II)-②	(II)-③
	(Part)		
50% alkyd resin solution (*1)	140	140	140
Upan 20SE (*2)	50	50	50
Titanium oxide (*3)	4.2	4.2	4.2
Carbon black (*4)	1.6	1.6	1.6
Oxide yellow (*5)	3.0	3.0	3.0
Organic red pigment (*6)	0.5	0.5	0.5
Cyanine blue (*7)	6.2	6.2	6.2
Barium sulfate (*8)	-	54.9	99.5
Clay (*9)	-	33.7	61
Talc (*10)	-	37	67
PVC	6.3	17.2	24.5

(\*4) Carbon black MA-100B, made by Mitsubishi Kasei Industry, Inc.

(\*5) MAPIKOERO XLO, made by Titanium Industry, Co., Ltd.

(\*6) KORO fine red 6820, made by Dainichiseika Industry, Co., Ltd.

(\*7) Phthalocyanine blue 5240K, made by Dainichiseika Industry, Co., Ltd.

(\*8) Precipitated barium sulfate100, made by Sakai Chemical Industry Co., Ltd.

(\*9) ASP-200, made by Engelhard Co.

(\*10) Talc No. 1, made by Takehara Chemical Industry, Co., Ltd.

### (4) Paint (II)

50% alkyd resin (*1)	140 part
Upan 20SE (*2)	50 part

Organic red pigment (\*6) 15 part  
 Xylol / n- heptanol (1/1) 50 part

The composition consisting the above ingredients was adjusted to have spray viscosity of 22 seconds (FORDCUP #4 / 20 DEGC) by SORUBETSUN #150.

## II. The execution examples and the comparison examples

The paint (I) was applied to the whole surface of the target objects using air spray so that it became about 30 $\mu$  based on the hardened film, and after leaving them at a room temperature for about 15 minutes, the paint (II)-① to ③ were applied to 1/2 of the coated area of the paint (I) so that they became about 20 $\mu$  based on the hardened films.

After leaving them at a room temperature for about 10 minutes, both films were made to harden simultaneously by heating at 140 DEGC for 30 minutes.

Next, The films of the paint (II) were masked except for the boundary portions, water grinding of these boundary portions and the coated surface of the paint (I) was carried out, and after these were washed, the masks were removed, and these were cleaned with oil benzene after blow dry. Next, the films of the paint (II) were masked like the above, the paint (III) was mainly applied to the coated surface of the paint (I) and the boundary part of the paint (I) and the paint (II), and after leaving them at a room temperature for about 10 minutes, they were made to harden by heating at 140 DEGC for 30 minutes.

The coated surface states of these examination boards were compared.

The results are shown in Table 2.

Table 2

	Execution example		Comparison example
	1	2	1
Painting process	Paint (I)		
	Paint (II).	Paint (II).	Paint (II).
	Paint (II)		
Difference in PVC (Paint (I) - paint (II))	2.3	-5	13.2
Coated surface state	Good	Good	Generation of may dents due to mist



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⑮ 発明の名称 塗膜形成方法

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明 細 書

1. 発明の名称

塗膜形成方法

2. 特許請求の範囲

熱硬化性樹脂と着色顔料および(または)体質顔料とを主成分とする溶液型熱硬化性塗料(I)を塗装し、次いで該塗面の一部に、顔料体積濃度を該塗料(I)と同一もしくは近似するようにタルク、クレーおよび硫酸バリウムから選ばれた1種以上の体質顔料で調整してなる着色塗料(II)を塗装し、加熱して該両塗膜を同時に硬化させたのち、塗料(I)が塗装されていない上記塗料(I)の塗面または塗料(I)ならびに塗料(II)の両塗面に着色塗料(II)を塗装することを特徴とする塗膜形成方法。

3. 発明の詳細な説明

本発明は、ウエット塗膜面の一部に着色塗料を塗装し、該両塗膜を同時に加熱硬化させたのち、該着色塗料の未塗装部分またはさらに該着色塗膜面にも他の着色塗料を塗装して仕上げてなる塗膜の仕上がり外観を向上せしめることに関する。

上記塗装方式の具体例として、例えば、未硬化の中塗りウエット塗膜面の目的とする部分に着色塗料を塗装し、該両塗膜を同時に加熱硬化したのち、中塗り塗面の上記着色塗料の未塗装部分に他の着色塗料を塗装するいわゆる2トーン仕上げがある。また、電着塗料などのプライマーを塗装した自動車内外板の塗装工程において、外板の中塗り塗膜がウエット(未硬化)状態で内板に上塗り塗料を塗装することがあり、その際、該外板の中塗りウエット塗面に内板用上塗り着色塗料の飛沫(ミスト)が塗着しやすく、その状態で塗膜を加熱硬化してから外板の中塗り塗面全面に上塗り塗装する工程もあげられる。これらの方式で、未硬化のウエット中塗り塗膜に着色塗料を塗り重ねる理由は、焼付工程を省略して経費削減、生産性向上をはかるところにある。

しかしながら、上記の2トーンカラー仕上げや自動車内外板塗装工程などにおいて、未硬化のウエット中塗り塗膜面に着色塗料(例えば2トーンカラー用の第1色目の着色塗料もしくはそのミス

ト、または内板に塗装した上塗り塗料のミストなどが塗着し、これらを加熱硬化してからさらに他の着色塗料例えば、2トーンカラー用の第2色目の着色塗料（外板用上塗り塗料）を塗装して形成した塗膜にはミスト塗着部分や2トーン仕上げの色境界部分に凹凸が発生し、平滑性を低下させる原因となっていた。平滑性を向上させるために、上記他の着色塗料の塗装に<sup>先</sup>立って、凹凸部を研磨することも行なわれていたが、実用的に不十分であり、凸凹性を改良できずその改善が強く望まれている。

そこで、本発明者は上記塗装系における平滑性向上を目的に鋭意研究を行なったところ、平滑に研磨した中塗り塗膜の表層部には着色塗料ミストなどの一部が残存しており、これらの塗面に他の着色塗料を塗装すると、該塗料中の溶剤が中塗り塗膜や着色塗膜（ミスト）を膨潤し、次いで焼付けると中塗り塗膜と着色塗膜（ミスト）との収縮率が異なることによって塗り重ねた他の着色塗膜に凹凸が生ずるものと判断した。つまり、他の着

色塗料を塗装し焼付けると、着色塗膜（ミスト）の収縮率が小さいとその部分が凹、収縮率が大きいと凸となり、これが他の着色塗膜を通じて塗膜表面に表われるものと推察した。

本発明者は、これらの知見にもとづいてさらに研究を進めた結果、例えば上記塗装系では、ウェットな中塗り塗膜に塗着する着色塗料の顔料体積濃度を特定の体質顔料を用いて該中塗り塗料のそれに一致もしくは近似させることによって平滑性を改善できることを見出した。

すなわち、本発明は、熱硬化性樹脂と着色顔料および（または）体質顔料とを主成分とする溶液型熱硬化性塗料(I)を塗装し、次いで該塗面の一部に、顔料体積濃度を該塗料(I)と同一もしくは近似するようにタルク、クレーおよび硫酸バリウムから選ばれた1種以上の体質顔料で調整してなる着色塗料(II)を塗装し、加熱して該両塗膜を同時に硬化させたのち、塗料(I)が塗装されていない上記塗料(I)の塗面または塗料(I)ならびに塗料(II)の両塗面に着色塗料(II)を塗装することを特徴とする塗膜形

成方法に関する。

本発明の特徴は、塗料(I)のウェット塗膜の一部に塗料(II)を塗装するにあたり、該塗料(II)の顔料体積濃度（以下、「PVC」という）が塗料(I)と同一もしくは近似するように特定の体質顔料で調整されたものであるところにある。すなわち、このように両塗料のPVCを調整しておくくと、塗料(I)のウェット塗膜面の一部に塗料(II)が塗着しても、該両塗膜の収縮率が同一もしくは近似して前記した凹凸現象の発生が殆どなくなり、平滑性が著しく改善された。なお、このPVCは、塗料(I)に塗料(II)を合わせることが好ましいが、本発明ではこれに限定されず、塗料(II)を基準にするか又は両塗料で調整してもさしつかえない。

次に、本発明の塗膜形成方法についてさらに具体的に説明する。

塗料(I)：熱硬化性樹脂組成物と着色顔料および（または）体質顔料とを主成分とする溶液型熱硬化性塗料であって、後記の塗料(II)および塗料(II)の被塗面を形成する塗料である。具体的には、前記

2トーンカラー仕上げや自動車外板用などの中塗り塗料があげられ、これら以外に、中塗り塗料の一部に特殊機能を持たせた別種塗料もあげられる。

熱硬化性樹脂は、例えばアルキド樹脂、ポリエステル樹脂、アクリル樹脂などから選ばれた基体樹脂とアミノ樹脂、ポリイソシアネート化合物（ブロック化合物も含む）などから選ばれた硬化剤とを主成分とする常温もしくは加熱によって架橋硬化する樹脂組成物が包含され、さらに必要に応じてエポキシ樹脂、ポリカプロラクトン、シクロヘキサン・ジメタノール化合物などの塗料用樹脂も併用できる。

着色顔料は、特に制限されず、例えば酸化チタン、カーボン、ベンガラ、フタロシアニンなどがあげられ、前記中塗り塗料に酸化チタンと少量のカーボンを用いることが特に好ましい。

また、体質顔料としては特に制限されずタルク、クレーおよび硫酸バリウムから選ばれたものが使用できる。さらに、ジシクロメート、亜鉛華、ストロンチウムクロメートなどの防食顔料も適用

できる。

塗料(I)の顔料として、上記着色顔料、体質顔料および防食顔料から選ばれた1種もしくは2種以上を使用でき、これらの顔料の配合量は目的に応じて任意選択されるが、前記中塗り塗料に施してはPVCにもとずいて10~30%、特に15~20%が好ましい。

本発明のPVCは、各塗料自体の硬化塗膜中に占める顔料の体質濃度である。

塗料(I)は上記成分を有機溶剤に溶解もしくは分散せしめたものであって、溶液型、非水分散液型および高固形分型などで使用できる。該塗料(I)は、自動車、電化製品、機械装置、事務機器などの被塗物に直接、もしくは表面処理や、電着塗料(カチオン型、アニオン型)などのプライマーなどを塗装した後に塗装してもさしつかえない。塗料(I)の塗装膜厚は、硬化塗膜に基いて15~60μ、特に20~40μが好ましい。塗装方法は特に制限されず、通常の方法、例えばエアスプレー、エアレススプレー、静電スプレー、ミニベルなどで

顔料を主成分としており、ビヒクル成分としては前記塗料(I)の熱硬化性樹脂が好ましく、着色顔料は目的とする色調の有機もしくは無機顔料を使用でき、体質顔料は前記した3種類から選ばれたものが使用される。

該塗料(II)のPVCに關し、目的の色調に調製した塗料のPVCは通常0.5~10%未満であって、これをそのまま塗料(I)の塗面に塗装すると前記した欠陥を発生するが、本発明では塗料(II)のPVCを体質顔料を用いて塗料(I)のそれと同一にするかまたは近似(塗料(I)のPVCのプラスマイナス5以内)させておく。塗料(II)のPVCが塗料(I)のそれに比べて5より小さくなると塗料(II)を塗装した後塗料(II)のミスト部や2トーン仕上げの色境界部などにヘコミが発生しやすく、5よりも大きくなるとその部分が突起するので好ましくない。

塗料(II)は上記各成分を有機溶剤に溶解もしくは分散することによって得られる。

該塗料(II)は塗料(I)の未硬化塗面の一部に塗装する。塗装膜厚は特に制限されないが、2トーンカ

行なえる。

塗料(II)：塗料(II)の塗膜面の一部に塗装する着色塗料で、PVCを塗料(I)と同一もしくは近似するようにタルク、クレーおよび硫酸バリウムから選ばれた体質顔料で調整してなることが必要である。

塗料(I)の塗膜面の一部に塗料(II)を塗装するとは、例えば、2トーンカラー仕上げをするために塗料(I)の塗膜面の一部に第1色目として塗料(II)を塗装する(その後、塗料(II)の未塗装部分に後記塗料(II)を塗装する)、塗料(II)を塗装してある自動車外板にその内板に塗装中の上塗り塗料(これが塗料(II)に該当する)が移もしくは粒状となって外板の塗料(I)のウェット塗面に塗着する現象(その後、外板の全面には後記塗料(II)を塗装する)などをあげることができる。

塗料(II)は、目的とする色調に仕上げるための着色顔料を含んだ着色塗料であり、しかもPVCが塗料(I)と同一もしくは近似するように特定の体質顔料で調整したところに特徴がある。すなわち、該塗料(II)は、ビヒクル成分、着色顔料および体質

ラー仕上げでは硬化塗膜にもとずいて20~40μが特に好ましい。

塗料(I)の塗面の一部に塗料(II)を塗装した後、加熱して該両塗膜を硬化させる。加熱温度は塗料の組成によって任意に選択できるが、100~200℃で10~40分間が好ましい。

次いで、2トーンカラー仕上げでは塗料(II)の塗膜境界部分や未塗装部分の塗料(I)の塗面に塗着した塗料(II)のミスト、または自動車の外板の塗料(II)の塗面に付着した内板に塗装した塗料(II)のミストによる凸部を研磨して平滑しておくことが好ましい。研磨後、塗料(II)の塗面に埋め込まれた塗料(II)が斑点状に残存していてもさしつかえない。

本発明では、必要に応じて研磨後、主として、塗料(II)が塗装されていない塗料(I)の塗面(塗料(II)の塗膜の境界付近も含む)、または研磨された塗料(II)の塗膜を含む塗料(I)の塗面に、塗料(II)を塗装する。このうち、前者は2トーンカラー仕上げ、後者は自動車内外板仕上げに相当する。

塗料(II)は、ビヒクル成分と着色顔料とを主成分

としており、ビヒクル成分は塗料(I)で例示したものから選ばれた熱硬化性樹脂が使用でき、着色顔料は塗料(II)で説明した顔料が使用でき、PVCは塗料(I)と同一もしくは近似させることは必須でなく、これらの成分を有機溶剤および(または)水に溶解もしくは分散させてなる溶液型、ハイソリッド型、非水分散液型などとして使用できる。

塗料(II)の塗膜厚は硬化塗膜にもとずいて20~40μが適している。

本発明に関する実施例および比較例について説明する。部および多はいずれも重量にもとずく。

#### 1. 試料の調整

##### (1) 被塗物

リン酸亜鉛系表面処理(日本パーカーライジング社製、ボンデライト#144)を施した軟鋼板(300×300×0.8mm)にカチオン型電着塗料(関西ペイント会社製、エレクトロン#9600)を塗装(硬化塗膜厚20μ)した鋼板。

##### (2) 塗料(I)

50%アルキド樹脂溶液(\*1) 140部

ユーバン20SE(\*2) 50部

酸化チタン(\*3) 100

キシロール/n-ブタノール(1/1) 17

からなる組成物をソルベツン#150で粘度25秒(フォードカップ#4/20℃)になるように調整した。PVCは19.5であった。

(\*1) 無水フタル酸1モル、トリメチロールプロパン1モルおよびヤシ油脂肪酸0.5モルからなる水酸基価85、油長31%、酸価7.3の50%アルキド樹脂溶液。

(\*2) 三井東圧化学工業製、ブタノール変性メラミン樹脂

(\*3) 堺化学工業製 TITONE R-650

##### (3) 塗料(II)

第 1 表

	(I)-①	(I)-②	(I)-③
50%アルキド樹脂溶液(*1)	(部) 140	140	140
ユーバン20SE(*2)	50	50	50
酸化チタン(*3)	4.2	4.2	4.2
カーボンブラック(*4)	1.6	1.6	1.6
オキサイドエロー(*5)	3.0	3.0	3.0
有機レッド顔料(*6)	0.5	0.5	0.5
シアニンブルー(*7)	6.2	6.2	6.2
硫酸バリウム(*8)	—	54.9	99.5
クレー(*9)	—	33.7	61
タルク(*10)	—	37	67
PVC	6.3	17.2	24.5

(\*4) 三菱化成工業製、カーボンブラック  
MA-100B

(\*5) チタン工業製、マビコエローXLO

(\*6) 大日精化工業製、コロファインレッド  
6820

(\*7) 大日精化工業製、フタロシアニンブルー  
5240K

(\*8) 堺化学工業製、沈降性硫酸バリウム100

(\*9) Engelhard Co. 製、ASP-200

(\*10) 竹原化学工業製、タルク1号

##### (4) 塗料(II)

50%アルキド樹脂(\*1) 140部

ユーバン20SE(\*2) 50 "

有機レッド顔料(\*6) 15 "

キシロール/n-ブタノール(1/1) 50 "

からなる組成物をソルベツン#150でスプレー粘度22秒(フォードカップ#4/20℃)に調整してなる塗料。

#### 1. 実施例および比較例

被塗物全面に塗料(I)を硬化塗膜にもとずいて約30μになるようにエアースプレーで塗装し、室温で約15分放置してから、該塗料(I)の塗装面の1/2の面積に塗料(II)-①~③を硬化塗膜にもとずいて約20μになるように塗装する。室温で約10分放置したのち、140℃で30分加熱し

て両塗膜を同時に硬化させる。

次に、塗料(I)の塗膜の境界部分を残してマスクし、この境界部および塗料(I)の塗面を#500の耐水研磨紙で水研ぎし、洗浄したのち、マスクをはずし、風乾してから石油ベンジンで清掃し、次いで塗料(II)の塗膜を前記と同様にマスクし、主として塗料(I)の塗面および塗料(I)と塗料(II)との境界部を塗料(II)で塗装し、室温で10分放置後、140℃で30分加熱して硬化せしめた。

これらの試験板の塗面状態を比較した。その結果を第2表に示した。

第 2 表

塗 装 工 程	実 施 例		比 較 例
	1	2	
	塗 料 (I)		
塗 料 (II) - ②	塗 料 (II) - ③		塗 料 (II) - ①
	塗 料 (II)		
PVC差 (塗料(I) - 塗料(II))	2.3	- 5	1 3.2
塗 面 状 態	良 好	良 好	コベト多ク発生

特許出願人 (140) 関西ペイント株式会社